Optics and Spectroscopy (English translation of Optika i Spektroskopiya) 2014 vol.116 N5, pages 661-666

Broadening of paramagnetic resonance lines by charged point defects in neodymium-doped scheelites

Baibekov E., Zverev D., Kurkin I., Rodionov A., Malkin B., Barbara B.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

We study paramagnetic resonance linewidth in a series of CaWO4 and CaMoO4 crystals with different concentrations of neodymium ions (0.0031-0.81 at %). Experimental data are interpreted in the framework of the statistical theory of line broadening by charged point defects. In our calculations, three different contributions are singled out: arising from the local electric fields, electric field gradients and magnetic fields of the nearby point defects. The interaction parameters are determined from the spectroscopic data available for Nd:CaWO4 crystal. Direct calculations of the linewidth are performed for different crystal orientations with respect to external magnetic field. We conclude that major contribution to the broadening comes from the interactions with random electric fields produced by neodymium and charge compensator ions.

http://dx.doi.org/10.1134/S0030400X1405004X